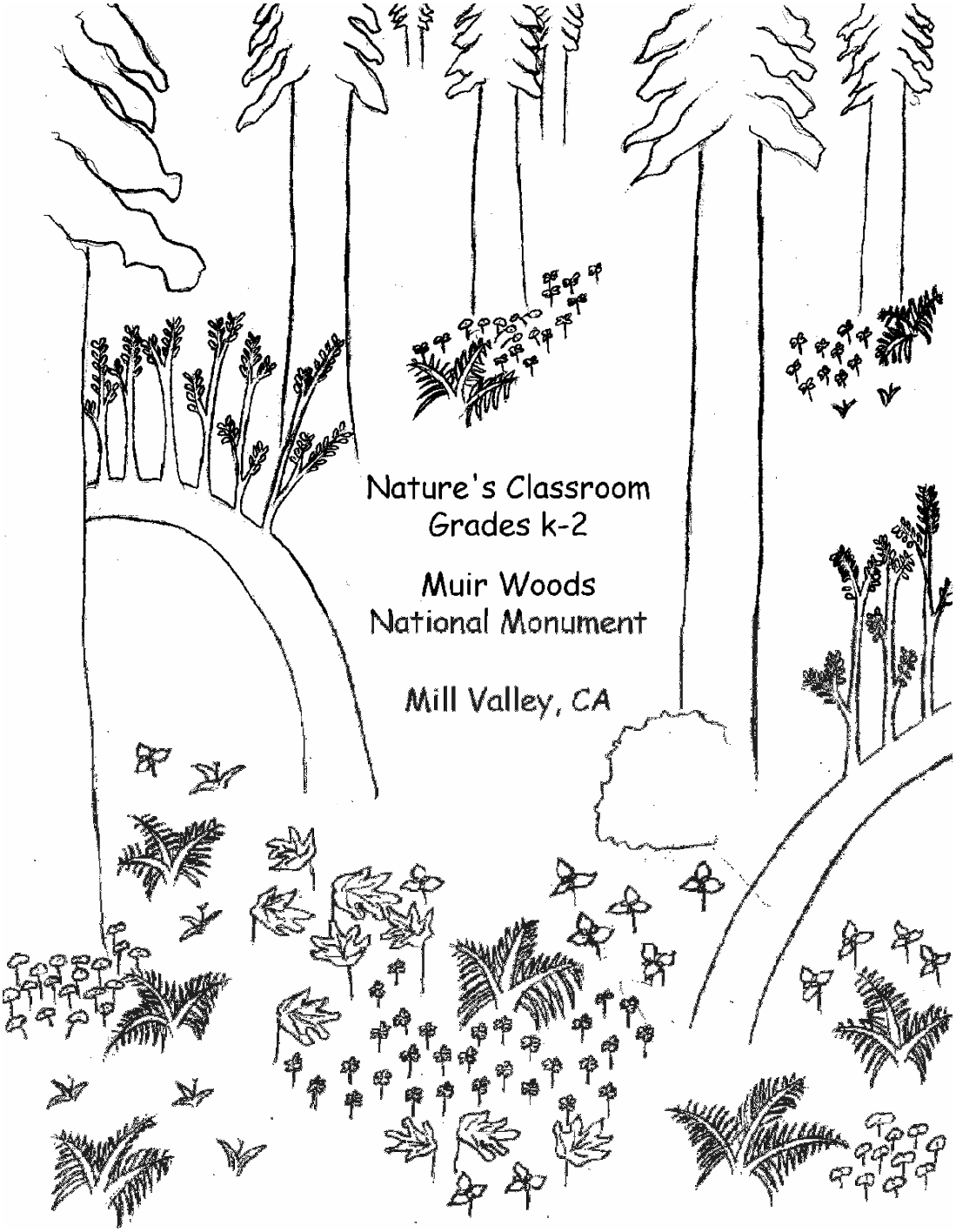
Nature's Classroom
Grades k-2
Muir Woods
National Monument
Mill Valley, CA

Dear Educator:

Welcome to the Parks as Classrooms program at Muir Woods National Monument. The Parks as Classrooms program strives to introduce the National Parks to teachers for use as a tool and educational resource. These programs, created in partnership with educators and community members, engage teachers and students in the mission of the National Park Service. They also serve to meet the educational needs of our communities and park supporters.

We are pleased that your class is participating in Nature's Classroom, an educational program for kindergarten through second grade. This program uses a photo tour of Muir Woods to lead students on an exploration of redwood tree growth and the survival of all life within the park. Because students may not be able to visit here at Muir Woods, we urge you to research parks, botanic gardens and museums of native growth in your local area. We believe students can learn a great deal about their local preservation efforts through the exciting lens of an old-growth Redwood forest.

We hope that you will enjoy participating in the program, and that your experience is educational and exciting! If you have any questions about the program, feel free to contact us at (415) 388-0107.

The Muir Woods Education Staff

## Program Overview:

Nature's Classroom is an educational program using a virtual photo tour of Muir Woods created in accordance with California state science standards. During the program, students will discover ecological concepts and issues of sustainability through questioning, activity, and facilitated discussion.

Each activity is designed to build on the last to show students' developing understanding of concepts. Concepts addressed in the program include:
-Redwood growth
-Survival of redwoods and other living things
-Habitat protection

There are four parts to the program:
-Pre-tour introductory lessons
-Photo Tour of Muir Woods
-Post-tour activity
-Program Assessment

## Pre-Tour Introductory Lessons

These lessons should be conducted at least one day prior to taking the "tour". They are designed to initiate student thinking about the parts of a forest, their views on forests, and using their five senses. In the classroom, the teacher acts as a facilitator while the students begin to formulate their own ideas about forest life.

## Virtual photo tour of Muir Woods

Students can view the photo tour included on the CD/website individually or as a group (as classroom technology allows). The Muir Woods / Redwood Ecology photo tour takes an in-depth look into the processes that form and shape a healthy Redwood forest system. Teachers should preview the photos and script to determine what level of information to provide for the students. Downloads of paper scripts for the photo tours are available on the CD/website.

## Post-Tour Activities

Included in this packet is a list of suggested post-tour activities. These activities are designed to allow the students to further examine their criteria for a healthy redwood forest ecosystem. They use the ideas the students started with and their experiences during the photo tour to demonstrate through creative art and scientific exploration what they learned and how they learned it.

# Pre-Tour Activities

The following are suggested examples of pre-tour activities. Feel free to use those that will work best for your class and your curriculum. You may choose to adapt the activities as you see fit.

## 1. Protecting Our Parks

**Summary**:

National parks exist for three reasons: to protect the resources within them, preserve those resources for future generations, and provide opportunities for people to visit those resources. In this activity, students will begin to explore things that may harm plants and animals and will come up with alternatives to those activities.

**Materials Needed**: Markers/Crayons

**Materials Provided**: Protecting Parks page

**Part I**

1. Tell your students that they will be taking a virtual tour of a very special place called a National Park. In this special place we do things to protect it. Discuss the following situations and questions:

- In a National Park, we don't hurt plants. How do you think you could hurt a plant?
- In a National Park, we don't hurt animals. How do you think you could hurt animals?
- In a National Park, we make sure that the park stays clean of garbage. What things do you think you can do to help keep the park clean?

2. Pass out the Protecting Parks page. Ask the students to look carefully at the image and circle the pictures of the children they think are doing the right things. Ask them why they think one behavior is "right" and another is "wrong". Also, discuss their recommendations for an alternative the children could do that would be less harmful. Use the information on the Teacher's Page to help you guide the discussion.

3. As a group, have your class discuss why it is important to protect the plants and animals at Muir Woods – not only for the wildlife's sake, but also so that these resources will be there in the future to be experienced by other park visitors.

**Part II**

## Protecting Our Parks: Teacher's Page

Children study the picture and decide which behavior is correct and incorrect. Students may color the picture.

After your students have completed the activity, discuss their answers with them.

**Correct:**
- Boy picking up trash. Keeping an area clean of garbage helps make the habitat safe for plants, animals, and people.
- Boy smelling flowers. Respect plants by not picking them.
- Girl taking a picture. She is appreciating the forest without disturbing it.

**Incorrect:**
- Boy picking flowers. Picking plants means they can't grow anymore, and by picking plants you may be destroying a home for an animal. Respect plants by letting them grow.
- Girl feeding animals. Human food can be bad for animals since they don't eat the same kinds of food as people. Animals that get human food forget how to get their own food and become dependent on people for food. Animals that get human food can become problems for people or even dangerous.
- Boy eating in the park and leaving trash on the ground. There is no eating in Muir Woods because of the danger of animals becoming dependent on our food. Also, leaving trash on the ground violates plant and animal habitats.
- Girl chasing bird. Disturbing animals in their habitat can hurt them and by chasing animals you can injure yourself. Respect animals by not disturbing them in their homes.
- Girl carving her initials into tree. Carving hurts the tree and also makes the park less beautiful to other visitors.
- Also, most of these kids have crossed over the fence. Crossing over the fence causes soil compaction that hurts the redwood trees by suffocating their roots. It can also cause damage to other plants by stamping on them.

## 2. Tools for Exploring Natural Areas

**Summary:**

Although scientists going out into the field make use a number of tools, some of the most important things can be discovered simply by using the tools on our bodies: our five senses. Part one of this activity will introduce students to the five senses; part two will give you the opportunity to create additional tools that you can use during your visit to a native natural area like Muir Woods.

**Materials Needed:** *(Part I)*

Several pieces of different textured fabric (velvet, corduroy, silk, etc.)
Several small jars with lids containing "smelly" things (perfume, etc.)
*(Part IIa)*
Cardboard; Rubber Bands; One or Two hole-puncher
Reused paper (blank on one side, four or five pages for each student)
Sticks or Pencils (5-6 inches long)
*(Part IIb)*
Toilet paper tubes (two for each student)
String; Stapler; Paint or markers; Single-hole puncher

**Part I – Sensory Exploration**

1. Explain that each student has five tools on their body that they can use to explore the natural world. Ask them to guess what those tools are (Eyes, ears, nose, mouth, fingers).
2. While the students close their eyes, pass around the pieces of fabric. Ask the students to describe how they feel. Are they similar? Different? What kinds of things do you think you would be able to feel at Muir Woods?
3. Pass around the jars of "smelly" things. Ask the students to describe how they smell. Are they similar? Different? What kinds of things would you be able to smell at Muir Woods?
4. Ask the students to name all of the sounds they hear in the classroom. Record these on the blackboard. Next, ask the students to close their eyes and mouths and be as quiet as they can for thirty seconds. At the end of the time period, ask them to name all of the sounds they heard and record them on the board. How does this list compare with the first one? Did they hear more sounds? Fewer? How can "turning off" some of our senses allow others to work better? What kinds of things would you be able to hear at Muir Woods?
5. After lunch, ask the students to name something they ate that came from a plant. Ask the students if they think they will find that plant at Muir Woods. Is it okay to eat these plants if we see them in the forest? (No) Why not? (They might be poisonous, and/or if we eat them, there will not be anything left for the animals to eat).

**Part IIa – Journals**

1. Cut cardboard into sections about 10x6 inches. Cut paper in half (the wide way).

2. Punch holes in the top of the paper and cardboard.

3. Place the pencil or stick across the holes; thread the rubber band through the holes and around the pencil.

**Part IIb – Binoculars**

1. Staple the two toilet paper tubes together side by side.

2. Decorate the tubes with paint or markers (but no sparkles or things that might fall off while walking through the woods).

3. Punch a hole in each tube and thread yarn or string through the holes. Make sure it is long enough to fit over the child's head.

## 3. What a Forest Means to Us

**Summary:**

Forests mean different things to different people and students who have never visited Muir Woods may have interesting ideas about what they will see there. In this lesson, students will produce a picture of what they believe they will find in the woods and then discuss their findings.

**Materials Needed:** Art Supplies
Butcher Paper

1. Divide the class into groups of five or six. Explain that each group will discuss what they would expect to see, feel, smell, hear, and taste in Muir Woods (you can have them record this information in their journals).

2. Each group then collaborates to produce a picture incorporating all of their expectations. Students can use their creativity and use cutouts from magazines, paint, pastels or crayons to create their forest.

**** At this point in the program, take students on the photo tour of Muir Woods. If possible, use a local native and/or natural area to reinforce concepts learned in the preceding activities.**

# Post-Tour Activities

These activities are geared towards cementing the concepts the students learned on their journey. Again, choose those most appropriate for your class and change the activities as necessary.

## 1. Build a Tree Activity

**Summary:** Following their "visit" to Muir Woods, students will need reinforcement of the concepts they learned. In this lesson, students re-create the life of a tree by collaborating in "building" a Redwood and acting out the processes that keep it alive.

**Materials needed:** None. Enough space should be provided for students to form a large circle.

1. **Heartwood** – This is the innermost layer of the tree. These children will stand straight and strong, and can make heartbeat noises if they like. This will be the smallest group with just one or two children for a group of 25.
2. **Xylem** – This is the next layer of the tree that brings the water up from the roots to the leaves. Students will crouch down and "grasp" the water with their hands, bringing it up to the leaves. This should be just a few children.
3. **Phloem** – This is the next layer that brings the sugars down from the leaves through the tree. These children start out standing with their arms like branches and slowly crouch down, bringing nutrients through the tree. This will be the second to largest group.
4. **Bark** – This layer protects the tree from insects who want to eat the sweet phloem, and also protects it from fire. These children should hold hands to protect the insides of the tree, and can softly "bark" like a dog. This will be most of the children because they need to fit around the rest of the group.

Once the tree is built, have it "work" with the heartwood standing straight and strong, the xylem delivering water, the phloem delivering nutrients, and the bark protecting the tree.

## 2. Revisiting Our Forests / Going Back in Time

**Part I**

**Summary:**

After their "visit" to Muir Woods, students will have different ideas about what kinds of things are found in a forest. In this lesson, students create pictures illustrating what they saw on the tour of Muir Woods and then compare them to the posters they made before.

1. Have students compare their pictures to the photo tour of Muir Woods. Questions to ask can include: What is different? What is the same? Ask about animal and plant types in the woods, and about habitat needs and characteristics.

**Part II**

**Summary:** Students should research what the area they lived in (i.e. their state, city or schoolyard) looked like before roads and buildings were constructed. They should find out what type of ecosystem was most predominant, what native plants thrived there, as well as the locations of creeks, rivers and watersheds. For example, students living in the Midwest may have remnants of the tallgrass prairie or Oak Savannas. Likewise, students in the Pacific Northwest may have temperate rainforests. Students can compare what the region looked like then and now. Teachers can help determine where areas remain with their own local "old-growth".

**Materials needed:** Art Supplies
Butcher Paper
Photos, paintings and writings regarding the local native ecosystem
Map of local area

1. Divide the class into groups. Each group should collaborate and use their imagination to produce a picture incorporating all of their research.
2. Have the groups compare their pictures and maps. What is different? What is the same? Do any native areas remain? What might any changes mean for the health of the environment? For the animals? For the plants?
3. If possible, try to arrange a site visit to a local native area or museum in order that students can directly experience concepts learned.

## 3. The Tree's in the Mail!

**Summary:**

After their tour of Muir Woods, students will have a basic knowledge of the life cycle of a tree. In this lesson, students will produce postcards illustrating parts of a redwood tree and things that redwood trees need to grow.

**Materials needed:** Information from photo tour and other sources
Paper (cut into postcard-sized pieces) or index cards
Markers, crayons, pencils, paint, etc.

1. Review the life cycle of a tree with the students. If necessary, refer back to self-guided park program, park nature guide brochure, or other resources.
2. Instruct the students that they are to create postcards showing different parts of a redwood tree (seeds, leaves, cones) or things that redwood trees need to survive (air, water, light). Each student should create three or four cards. Postcards can also show animal and insect life in the woods. Students can describe different parts of the animal or insect, such as the slimy exterior of a Banana Slug, the wings of a Monarch Butterfly or the antlers of a male Black-Tailed Deer.
3. Each card should contain one illustration along with a one- or two-sentence note about what is happening in the picture.
4. Encourage your students to share their postcards with their families, create an art gallery in your classroom, or mail them to us at Muir Woods.

# Teacher Evaluation

NAME: SCHOOL:

ADDRESS: GRADE:

1. What material was helpful for you? Which teaching tools did you use? (i.e. Information sheet downloads, Photo Tour, Redwood Vocabulary list, etc.).

2. Did your students complete any of the pre- or post-tour activities? (Circle the activities completed). What was your impression of these activities?

a. Protecting Our Parks
b. Tools for Exploring Muir Woods
c. What a Forest Means to Us
d. Revisiting our Forests / Going Back in Time
e. The Tree's in the Mail!

5. Was the program appropriate to your grade level? YES NO

6. Did Nature's Classroom add to the students' experience at a local native area? If yes, in what way? If no, why not? Do you think the story of Old-Growth Redwoods at Muir Woods is a good vehicle for teaching about preservation efforts in your area?

8. What did you like the most about the Nature's Classroom program?

9. What would you change about the Nature's Classroom program?

**Please send the completed form to: Education Coordinator,**
**Muir Woods National Monument,**
**Mill Valley, CA 94965**

# Redwood Vocabulary

You may want to share these words with your class before your Muir Woods tour, or you may find them helpful during your "exploration" of Muir Woods.

**Bark –** the protective outer layer ("skin") of a tree or woody shrub. It covers the branches, trunk, and roots and assists in protecting the plant from disease, insects, and fire.

**Burl** – woody growth at the base of a redwood tree. It contains dormant redwood buds that sprout when the tree undergoes stress (fire, flood, human impact, etc.).

**Canopy** – layer formed by the leaves and branches of the forests' tallest trees. At Muir Woods the canopy is over 200 feet above the ground. It creates the cool and shady atmosphere in the woods.

**Cone** – woody reproductive part of cone bearing trees. It contains the seeds for the growth of young trees. Some cone bearing trees at Muir Woods: Douglas Fir, redwood.

**Creek** – flowing water, a small stream. A non-living element of a forest habitat. Redwood Creek flows from Mount Tamalpais to the Pacific Ocean.

**Evergreen** – a tree or plant whose leaves or needles stay green all year round. Examples: redwood, Douglas Fir, Evergreen Huckleberry.

**Family Circle** – the growth of redwood trees in a ring as a result of having sprouted from burls.

**Habitat** – the place where a person or other organism is most likely to be found; type of environment that an animal or plant normally lives or occurs. Some examples of habitats at Muir Woods: Redwood Creek is a habitat for Steelhead fingerlings; the redwood forest is a habitat for Spotted Owls.

**Living elements** – those that can take in food, get energy from it, grow, adapt to their surroundings, and reproduce their kind.

**National Park/National Monument** – a natural landmark, historic site, or tract of land set aside by a national government for preservation and public enjoyment.

**Non-living elements** – temperature, topography, climate, geology, and geography.

**Old Growth** – unlogged forest dominated by trees over 250 years old. Characteristics include: large trees, mixed forest age, mixed type of trees, snags, accumulations of decaying wood supporting plants and animals.

**Preserve** – to keep in unaltered condition, maintain unchanged.

**Protect** – to keep from being damaged or injured.

**Provide** – to furnish, supply, make available.

**Recycle** – to put through a cycle again, to reuse, to reprocess so as to use again.

**Understory** – the smaller shrubs and trees growing under the taller forest canopy.

# Teacher's Reference List

We have many great resources available a the Visitor Center bookstore. You may find a book that you wish to share with your class before a Muir Woods visit, or a video to incorporate into your curriculum. **Teachers receive a 15% discount on all items purchased for educational use**, and mail order is available. Just call (415) 388-7368 and allow 2-3 weeks time for shipping.
* items available at the Muir Woods Visitor Center.

## Muir Woods

* Frank, Susan and Frank, Phil, ***The Muir Woods Handbook***, ISBN: 0764910272
* Hart, John, ***Muir Woods: Redwood Refuge***, ISBN: 0962520640
* Khosla, Maya, ***Web of Water***, ISBN: 1883869277
* Morley, Jim, ***Muir Woods***, ISBN: 0938765531

## Redwood Forests/Ancient Forests

* Anderson, Margaret, Field, Nancy, and Stephenson, Karen, ***Ancient Forests: Discovering Nature***, ISBN: 0941042146
* Adler, David A., ***Redwoods Are the Tallest Trees in the World***, ISBN: 069001368X
Collings, Randy, ***Redwood Empire***
Cooper, Ann, ***In the Forest***, ISBN: 0916278719
* Guiney, Miriam, ***Redwood Parks Activity Book***
Hewes, Jeremy Joan, ***Redwoods: World's Tallest Trees***, ISBN: 0831773812
* Reed-Jones, Carol, ***The Tree in the Ancient Forest*** ISBN: 1883220319
* Schneider, Bill, ***The Tree Giants: The Story of the Redwoods, The World's Largest Trees***, ISBN: 0937959405
* Vieira, Linda, ***The Ever-Living Tree: The Life and Times of a Coast Redwood***, ISBN: 0802774776

## John Muir

* Cornell, Joseph, ***John Muir: My Life with Nature***, ISBN: 1584690097
* Greene, Carol, ***John Muir: Man of the Wild Places***, ISBN: 0516442201
* Muir, John, ***Stickeen***, ISBN: 1883220785
* Stetson, Lee, ed., ***The Wild Muir***, ISBN: 0939666758

## Wildlife

Dunmire, Marj, ***Faces of the Forest***, ISBN: 0942559088
Guiberson, Branda Z., ***Salmon Story***, ISBN: 0805042547
The California Center for Wildlife, ***Living with Wildlife***, ISBN: 0871565471
National Wildlife Federation, ***Ranger Rick's Nature Scope***
Steelquist, Robert, ***Field Guide to Pacific Salmon***, ISBN: 0912365641

## Native American

* Caduto, Michael J. and Bruchac, Joseph, ***Native Plant Stories***, ISBN: 1555912125
Caduto, Michael J. and Bruchac, Joseph, ***Keepers of the Animals***, ISBN: 1555913865
Caduto, Michael J. and Bruchac, Joseph, ***Keepers of the Earth***, ISBN: 1555913857
* Margolin, Malcolm, ***The Ohlone Way***, ISBN: 0930588010

## Activity Books

Chichester, Page, ***The National Wildlife Federation Book of Family Nature Activities***, ISBN: 0805046860

* Cornell, Joseph, ***Sharing Nature With Children***, ISBN: 1883220734
Cornell, Joseph, ***Sharing Nature With Children II***, ISBN: 1883220874
* Ferra, Lorraine, ***A Crow Doesn't Need A Shadow: A Guide to Writing Poetry from Nature***, ISBN: 0879056002
Field, Nancy and Machlis, Sally, ***Discovering Endangered Species: A Nature Activity Book***, ISBN: 094104209X
* Field, Nancy and Machlis, Sally, ***Discovering Salmon: A Nature Activity Book***, ISBN: 0941042057

## Natural History

* Kricher, John, ***Peterson's First Guide to Forests***, ISBN: 0395971977
Kricher, John, and Bennet, Sarah, ***Peterson Field Guide to Coloring Books – Forests***, ISBN: 0395346762
* Lyons, Kathleen, and Cooney-Lazaneo, Mary Beth, ***Plants of the Coast Redwood Region***, ISBN: 0962696102
* Mitchell, Andrew, ***The Young Naturalist: An Usborne Guide***, ISBN: 086020653X
* Ross, Michael Elsohn, ***Flower Watching with Alice Eastwood***, ISBN: 1575050056
* Watts, Phoebe, ***Redwood Region Flower Finder***, ISBN: 0912550082
* ***The Usborne Complete First Book of Nature***, ISBN: 0746005636

## Audio

* Banana Slug String Band, "Adventure on the Air Cycle" audio tape
* Banana Slug String Band, "Dirt Made My Lunch" audio tape
Miche, Mary, "Earthy Tunes" audio tape. Song Trek Music, Berkeley.
Miche, Mary, "Nature Nuts" audio tape. Song Trek Music, Berkeley.

## Video

* Cornell, Joseph, ***Sharing Nature with Children***, video, Dawn Publications.
* Frederic Back, ***The Man Who Planted Trees***, video, ISBN: 1559741112

## Additional Resources

**Association for Environmental and Outdoor Education (AEOE)**
2120 N. Pacific Ave. #84, Santa Cruz, CA 95060 Phone: (831) 684-0148

**Bay Area Environmental Education Fair (BAEER)**
Takes place in San Rafael in the Marin County Civic Center.

**Golden Gate National Parks Conservancy**
www.parksconservancy.org

**Humboldt Redwoods Interpretive Association**
P.O. Box 276, Weott, CA 95571 Phone: (707) 946-2263

**Muir Woods Web Site:** http://www.nps.gov/muwo

**National Park Service Web Site:** www.nps.gov

**Save-the-Redwoods League**
114 Sansome Street, San Francisco, CA 94104 Phone: (415) 362-2352

# Selected California State Science Standards

## Kindergarten:

1. Life Sciences: Different types of plants and animals inhabit the earth. As a basis for understanding this concept:
- Students know how to observe and describe similarities and differences in the appearance and behavior of plants and animals (i.e. – seed-bearing plants, birds, fish, insects).
- Students know how to identify major structures of common plants and animals (i.e. – stems, leaves, roots, arms, wings, legs).

2. Investigation and Experimentation: Scientific progress is made by asking meaningful questions and conducting careful investigations. As a basis for understanding this concept, students should develop their own questions and perform investigations. Students will:
- Observe common objects by using the five senses.
- Communicate observations orally and through drawings.

## Grade 1:

1. Life Sciences: Plants and animals meet their needs in different ways. As a basis for understanding this concept:
- Plants and animals inhabit different kinds of environments and have external features that help them thrive in different kinds of places.
- Students know both plants and animals need water, animals need food, and plants need light.
- Students know animals eat plants or other animals for food and may also use plants or even other animals for shelter and nesting.
- Students know roots are associated with the intake of water and soil nutrients and green leaves are associated with making food from sunlight.

## Grade Two:

1. Life Sciences: Plants and animals have predictable life cycles. As a basis for understanding this concept:
- Students know many characteristics of an organism are inherited from the parents. Some characteristics are caused or influenced by the environment.
- Students know light, gravity, touch, or environmental stress can affect the germination, growth, and development of plants.